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**(54) SHEET FOR SOLID INK JET TYPE PRINTER AND ITS MANUFACTURE**

**(57) Abstract**

**PROBLEM TO BE SOLVED:** To provide an ink jet recording medium for obtaining a recording image in which an ink is scarcely released due to a scratch with a smooth surface without protrusion and recess parts due to a protrusion of the ink at the time of using in a solid ink jet type color printer.

**SOLUTION:** The sheet for a solid ink jet type printer comprises a sheet-like support, and a porous resin-containing coating layer formed at least on one side surface of the support in such a manner that a mean pore size of the surface of the coating layer is in a range of 0.5 to 50  $\mu\text{m}$ . Preferably, in the sheet, a mean pore size of the surface of the coating layer is in a range of 5 to 50  $\mu\text{m}$ .

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**CLAIMS**

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[Claim(s)]

[Claim 1]A sheet for solid ink jet type printers which is provided with the following and characterized by an average stoma diameter on said surface of a coating layer being in the range of 0.5 to 50 micrometers.

Sheet shaped support.

A porous resin content coating layer of this base material formed on the whole surface at least.

[Claim 2]The sheet for solid ink jet type printers according to claim 1 in a range whose average stoma diameter on said surface of a coating layer is 5-50 micrometers.

[Claim 3]The sheet for solid ink jet type printers according to claim 1 or 2 in a range whose percentage of area of an aperture occupied by a stoma on said surface of a coating layer is 10 to 70%.

[Claim 4]Said resin Polyvinyl acetate, polyurethane, a urethane acrylic copolymer, A styrene butadiene copolymer, a styrene acrylic copolymer, a nitril butadiene copolymer, Polyacrylic ester, acrylic resin, a polyvinyl chloride acetate copolymer, Polybutyl methacrylate, an ethylene-vinylacetate copolymer, a styrene butadiene acrylic copolymer, the sheet for solid ink jet type printers according to claim 1, 2, or 3 that is at least one sort chosen from each moisture powder type resin of a polyvinylidene chloride.

[Claim 5]Resin content coating liquid which gave mechanical agitation to resin content coating liquid, and made detailed air bubbles contain, sheet shaped support -- at least -- a whole surface top -- a manufacturing method of coating and a sheet for solid ink jet type printers which dries, forms a porous resin content coating layer, and makes an average stoma diameter of the surface of said porous resin content coating layer the range of 0.5 to 50 micrometers.

[Claim 6]Resin content coating liquid which a porous resin content coating layer gave mechanical agitation to resin content coating liquid, made contain detailed air bubbles, and made one 1 to 10 times the volume of this, A manufacturing method of the sheet for solid ink jet type printers of sheet shaped support according to claim 5 which are coating and a porous resin content coating layer to dry on the whole surface at least.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to a suitable ink jet recording body for solid ink jet type color printers, and a manufacturing method for the same especially about a sheet for ink jet type printers, and a manufacturing method for the same.

[0002]

[Description of the Prior Art]In recent years, with progress of the treatment technique of digital information, various kinds of color recording methods and printers are proposed, and a high-definition color picture can be easily formed now also in various fields of industry, an office, and a home. The ink jet type printer which injects water ink on a record sheet from a minute nozzle, and forms a picture by a minute dot also in it has remarkable spread. However, since the water-based ink is used and the water resisting property of a recorded image -- a picture flows by \*\*\*\*\* -- is inferior, the improvement of this problem is demanded. As a printer of an inkjet method, heat and fuse not a water-based ink but the solid ink (solid ink) of a synthetic wax system, and it injects on a record sheet from a minute nozzle like an aqueous inkjet method, There is a method which forms a picture by a minute dot (a publishing office besides "chemicals [ printer material and ]" 1995, and editorial-supervision:Kyosuke Takahashi: CMC Co., Ltd.). [ the so-called printer of a solid inkjet method, and ]

[0003]The fixing method of the picture formed as a difference between a solid inkjet method and an aqueous inkjet method on [ other than the difference in the state of the above-mentioned ink to be used ] the record sheet is mentioned. That is, although the ink of the molten state injected on the record sheet gets cold, is solidified in an instant and a picture is formed in a solid inkjet method, after this process, a record sheet is passed between the pressurized rollers and the fixability of the ink layer is improved. When, by the \*\*\* aqueous inkjet method, in order to fix the injected ink, the layer which has the absorption of ink called an ink absorbing layer and a fixing function is provided in the record sheet. Since record of a solid ink jet type printer sheet is possible also for the paper which has not provided the ink absorbing layer, there is an advantage that there is no restriction in a paper (above refer to it in literature [ : "printer material and chemicals" ]). However, the paper which a printer maker recommends is the paper which generally made high smoothness in the calendar to the surface as an object for solid ink jet type printers.

Since the surface is precise, the injected ink does not permeate the inside of a record sheet easily.

As a result, since ink remains in the record sheet surface, even if it passes between pressurizing rollers, Without the ability to cancel unevenness of the ink used as a picture, the surface of a picture becomes that the bottom is easy to become a feel coarsely, or. When the projection on which the sheet which recorded the picture is piled up is contacted or it is made a roll, it rubs against the rear face of the fields in which the picture was formed, or a record sheet, and a picture exfoliates, namely, there were problems, like the rubfastness of a recorded image is inferior. Since especially large-sized recorded images, such as an indoor external use display and a poster, are made into the shape of a roll in many cases in the case of carrying, the

improvement of exfoliation of the picture depended for rubbing is demanded strongly.

[0004]

[Problem(s) to be Solved by the Invention]When this invention solves the above-mentioned problem and it is used for a solid ink jet type color printer, there is no unevenness by climax of ink, it is smooth and the surface provides the ink jet recording body from which the recorded image which exfoliation of ink does not produce easily due to a scratch is obtained.

[0005]

[Means for Solving the Problem]This invention contains the following mode.

[1]A sheet for solid ink jet type printers, wherein it has sheet shaped support and the porous resin content coating layer of this base material formed on the whole surface at least and an average stoma diameter on said surface of a coating layer is in the range of 0.5 to 50 micrometers.

[2]It is in a range whose average stoma diameter on said surface of a coating layer is 5-50 micrometers. [1]A sheet for solid ink jet type printers of a statement.

[3]It is in a range whose percentage of area of an aperture occupied by a stoma on said surface of a coating layer is 10 to 70%. [1]or[2]A sheet for solid ink jet type printers of a statement.

[4]Said resin Polyvinyl acetate, polyurethane, a urethane acrylic copolymer, A styrene acrylic copolymer, a styrene butadiene copolymer, a nitril butadiene copolymer, It is at least one sort chosen from polyacrylic ester, acrylic resin, a polyvinyl chloride acetate copolymer, polybutyl methacrylate, an ethylene-vinylacetate copolymer, a styrene butadiene acrylic copolymer, and each moisture powder type resin of a polyvinylidene chloride. [1]\*\*[2]or[3]A sheet for solid ink jet type printers of a statement.

[5]Resin content coating liquid which gave mechanical agitation to resin content coating liquid, and made detailed air bubbles contain, sheet shaped support -- at least -- a whole surface top -- a manufacturing method of coating and a sheet for solid ink jet type printers which dries, forms a porous resin content coating layer, and makes an average stoma diameter of the surface of said porous resin content coating layer the range of 0.5 to 50 micrometers.

[6]Even if there is little sheet shaped support about resin content coating liquid which a porous resin content coating layer gave mechanical agitation to resin content coating liquid, made contain detailed air bubbles, and made one 1 to 10 times the volume of this, they are coating and a porous resin content coating layer to dry on the whole surface. [5]A manufacturing method of a sheet for solid ink jet type printers of a statement.

[7]Melting of the solid ink jet ink is warmed and carried out, and a drop is formed, [1]-A solid ink jet recording method given to a sheet surface for solid ink jet type printers given in either of [4].

[0006]A manufacturing method of a sheet for solid ink jet type color printers of this invention, Cellular content resin liquid which gave mechanical agitation to resin containing liquid and made many detailed air bubbles contain, It is a thing of sheet shaped support characterized by coating and drying, forming a porous coating layer and controlling an average stoma diameter of the surface of said porous coating layer in the range of 0.5 to 50 micrometers on the whole surface at least.

[0007]

[Embodiment of the Invention]By forming the porous coating layer containing many minute bubbles on sheet shaped support, as a result of inquiring wholeheartedly that this invention persons should attain the above-mentioned purpose, By rationalizing the average stoma diameter of the surface of this porous coating layer, it finds out that the above-mentioned problem is solvable, and came to complete this invention.

[0008]Namely, by giving mechanical agitation to resin containing liquid in record by a solid inkjet method, the cellular content resin liquid which made many fine bubbles contain -- a base material top -- coating -- it drying, and a porous coating layer being formed and, There is no unevenness according the average stoma diameter of the surface of this porous coating layer to climax of ink the range of 0.5-50 micrometers and by controlling in the range of 5-50 micrometers preferably, and are smooth in the surface, And the rubfast outstanding recorded image which exfoliation of ink does not produce easily due to a scratch can be obtained.

[0009]In this invention, the porous resin content coating layer can make the mixture liquid which

includes resin containing liquid or resin, and paints as the main ingredients able to contain many fine bubbles, can carry out coating of this on sheet shaped support, and can obtain it by drying. [0010]As resin which can be used for formation of a porous resin content coating layer in this invention, For example, polyvinyl alcohol and silyl denaturation polyvinyl alcohol of various molecular weights and the degree of saponification, derivatives, such as cation denaturation polyvinyl alcohol, starch, and its derivative (an oxidized starch.) various modified starch like cation-ized starch, cellulose, and its derivative (methoxy cellulose.) Carboxymethyl cellulose, methyl cellulose, ethyl cellulose, etc., Sodium polyacrylate, a polyvinyl pyrrolidone, an acrylic acid amide acrylic ester copolymer, An acrylic acid amide acrylic ester methacrylic-acid-ester copolymer, The alkali salt, the polyacrylic acid amide, and its derivative of a styrene maleic anhydride copolymer, Water soluble resin, such as a polyethylene glycol, and polyvinyl acetate, Polyurethane, a urethane acrylic copolymer, a styrene acrylic copolymer, A styrene butadiene copolymer, a nitril butadiene copolymer, polyacrylic ester, acrylic resin, a polyvinyl chloride acetate copolymer, polybutyl methacrylate, an ethylene-vinylacetate copolymer, They are not moisture powder type resin, such as a styrene butadiene acrylic copolymer and a polyvinylidene chloride, and a thing limited to these although glue, casein, soybean protein, gelatin, sodium alginate, etc. can be used further. Its intensity of resin itself is high, and since moisture powder type resin, such as polyurethane and a urethane acrylic copolymer, is excellent also in intensity when a porous coat is used, it is especially preferred. Two or more kinds can use these resin if needed, being able to be independent or mixing.

[0011]In this invention, as paints which can be included in a porous resin content coating layer, For example, a zinc oxide, titanium oxide, calcium carbonate, silicic acid, silicate, clay, Talc, mica, calcination clay, aluminium hydroxide, barium sulfate, Inorganic pigments, such as lithopone, silica, and colloidal silica, polystyrene, Real balls, such as polyethylene, polypropylene, an epoxy resin, an acrylic resin, and a styrene acrylic copolymer, In hollow or various shape, the plastic pigment of the type processed into structure, and the plastic pigment that has a hollow structured, Although the gas which expands with heating to the hollow sections can be included and organic colors, such as what is called heating dilatability particles to which the plastic pigment itself expands as a result, starch powder, cellulose powder, etc. can be used, it is not limited to these. Especially, since that the effect that detailed silica, colloidal silica, etc. control the blocking nature of a resin content porosity coating layer by a little use is acquired and clay, calcium carbonate, etc. are cheap and they have a merit called a reduce manufacturing cost, they are preferred. Two or more kinds can use these paints if needed, being able to be independent or mixing.

[0012]As a rate of a compounding ratio of the aforementioned aqueous resin for acquiring a good solid ink-jet-recording picture, and paints, paints are 0 to 900 weight sections to solid content 100 weight section of resin. if paints combination number of copies exceeds this range, the intensity of a required porous coating layer should not be obtained, but a record sheet should pile up -- rubbing -- etc. -- there is a possibility of generating the trouble of exfoliation of a picture, dirt, etc.

[0013]In the liquid object containing resin before cellular formation or resin, and the mixture of paints, publicly known viscosity modifiers (what is called a thickener etc.), a dispersing agent, a stain, a water resistance-ized agent, lubricant, a cross linking agent, a plasticizer, etc. can be added if needed.

[0014]Although the coating amount in particular of the porous coating layer to sheet shaped support is not limited, it is preferred to make it the range whose dry weight per  $1\text{-m}^2$  on the whole surface of a base material is  $2\text{--}40\text{g}$ . When there are few coating amounts than  $2\text{ g/m}^2$ , since it becomes easy to generate a feeling of unevenness of a picture, and exfoliation, without it becoming difficult to fully cover the surface's of a base material, and being able to form an expected porous coating layer, it is not desirable. On the other hand, when exceeding  $40\text{ g/m}^2$ , the thickness of a porous coating layer becomes excessive and it becomes easy to generate what is called dimples, such as modification by compression, and damage.

[0015]The volume ratio (it is described as expansion ratio below) to the undiluted solution of

cellular content liquid exceeds 1 time preferably, and it is preferred that they are 10 or less times. More preferably, 1 time is exceeded and they are 5 or less times. That is, expansion ratio is a measure which shows the cellular content in cellular content resin liquid, and if expansion ratio becomes large, it means that the thickness of the resin layer which forms air bubbles becomes thin. Thus, if a resin layer becomes thin, the intensity to the scratch of the resin content porosity coating layer obtained will fall, and a recorded image will separate easily. Since it becomes difficult to maintain the intensity to compression on enough levels, it becomes easy to generate the same dimple as the above.

[0016]In the sheet for solid ink jet type color printers of this invention, the reason which can control exfoliation of the ink which there is no unevenness of a recorded image part, and was established by scratch is considered that the physical character (structural characteristic and external characteristic) of a resin content porosity coating layer is involving.

[0017]In the first place, the feature of the structural face that many detailed stomata exist in the record sheet surface is mentioned. That is, a picture is formed, as the ink of the molten state injected on the record sheet permeates the stoma of the resin content porosity coating layer surface and is captured. In this point, the size of the stoma of the porous coating layer surface formed on the sheet of this invention is important. Namely, in order for the ink of the injected molten state to adhere and permeate a porous coating layer certainly, it is necessary to make the average stoma diameter of the porous coating layer surface into the range of 0.5 to 50 micrometers, and 50-micrometer 50 micrometers are the range of 5 to 45 micrometers in 5 micrometers from 2 micrometers preferably. If the area of the aperture occupied by a stoma among the whole surface products of the porous coating layer surface is 10 thru/or 70% of range comparatively (aperture area ratio [ of the porous coating layer surface ] %), the more outstanding performance can be revealed. It is 30 to 70% preferably. If an average stoma diameter is smaller than 0.5 micrometer, it will become insufficient permeating the inside of a coating layer of the ink of a molten state, and the good fixing effect by the pressurizing roller mentioned later will not be acquired. It will be rough after record and admiration (unevenness) will remain. On the other hand, when it exceeds 50 micrometers, with essential unevenness of the porous coating layer surface before recorded image formation, the osmosis nonuniformity of melted ink arises, the roughness of the recorded image itself which cannot be covered by the flattening effect by a pressurizing roller is produced, and there are things. Since the ink solidified as the range of an average stoma diameter is 5 to 50 micrometers shifts easily into a coating layer, the outstanding record without a feeling of a rough deposit (unevenness) is acquired.

[0018]Drawing 1 is a figure showing an example of the recording surface of this invention article. After vapor-depositing golden-palladium with an evaporation apparatus to the recording surface of a printer sheet, using an optical microscope (470 times), furthermore it took instant photography (Polaroid photograph), this is photoed with a CCD camera, binarization processing is performed, and a fine-pores portion is expressed in white. Having a characteristic structure where the fine pores (it is also called a stoma) as which the aperture area rate was expressed in the white based on a bubble very greatly (50% of puncturing area rate) are accepted clearly, the average stoma diameter showed 8 micrometers and a big value. This makes the coating liquid which uses polyurethane resin as the main ingredients one 4.0 times the expansion ratio of this, carries out coating, and shows the example which made the dry coating amount 10 g/m<sup>2</sup>. On the other hand, drawing 2 is the commercial paper only for a color ink jet (high-grade), and provides a pigment coating layer. Although this coating layer is using the porous pigment as the main ingredients, the actually beautiful stoma of an approximate circle form is not accepted under a microscope. It turns out that it completely differs from the structure of having a hole based on a bubble compared with the sheet for solid ink jets of this invention.

[0019]By the cushioning properties which the coating layer itself has intrinsically although it is a porous coating layer which uses [ second ] resin as the main ingredients therefore. Since the adhesion of a roller surface and a record sheet becomes good on the occasion of the processing on the surface of a recorded image by a pressurizing roller built in the printer of the solid inkjet method of this invention, it is certainly fixed to the ink permeated or captured in the stoma of

the porous coating layer surface. As a result, while unevenness by climax of ink is lost to an image surface, it is thought that a recorded image becomes difficult to exfoliate by scratch.

[0020]As sheet shaped support in this invention, papers which use cellulose as the main ingredients, such as paper, coated paper, and a laminated paper, are used suitably. It is usable in textile fabrics, a nonwoven fabric, etc. Porous synthetic resin films etc. which consist of plastic films, such as polyolefine, methacrylate, and cellulose acetate, polyolefine, and paints besides papers, such as a synthetic paper and a foaming polypropylene film, can be used. Especially when the paper and coated paper which contain cellulose as the main ingredients are used as a base material, there is also an advantage of being recyclable.

[0021]In this invention, the agitator of batch types, such as a foaming machine for what is called confectionery which has an impeller which rotates as a device which can make resin containing liquid contain and distribute air bubbles carrying out a sun and planet motion, for example, a homomixer currently generally used for emulsification dispersion etc., and cow loess dissolver, is mentioned. When producing continuously on a scale of being industrial, the device which is agitated mechanically, feeding air and the mixture of resin containing liquid continuously in a sealing system, can distribute air to detailed air bubbles and can be mixed is more preferred. For example, the multiplex [ with a slit ] cylindrical continuation foaming machine of the American Gaston County company (in the gap of the stator which became multiplex [ which was attached to the slit on the side / cylindrical ].) By cylindrical, and by agitating resin liquid and air, when insert in a stator and the rotor which has the same slit on the side, the high velocity revolution of the rotor is carried out, resin containing liquid and air are fed and a slit is passed, The type which distributes air and is mixed in resin containing liquid, the Aicohsha factory in Japan, Double cylindrical continuation foaming machines, such as a stokes company of the Netherlands (it comprises a rotor with a pin, and an outer cylinder tube with a pin, and) Air is distributed in resin containing liquid by agitating the resin containing liquid and air which made carry out the high velocity revolution of the rotor, and were fed in the cylinder, The type etc. to mix can be used, each of these devices is completely satisfactory in the point of manufacturing cellular content resin liquid, and there is no strict restriction in particular in device selection.

[0022]In the case of a batch type agitating device, in various kinds of aforementioned foaming machines, selection of the presentation of resin containing liquid, description, revolving speed (a surface-active agent appending rate, a kind, the viscosity of resin containing liquid, etc.), rotational duration, etc. is the point as a method of controlling the size of the air bubbles distributed in cellular content resin liquid. Expansion ratio is also controllable by the almost aforementioned factor. In the case of a \*\*\*\* continuation foaming machine, the size of air bubbles is [ when ] controllable by the resin containing liquid within the presentation of resin containing liquid, description, revolving speed (a surface-active agent appending rate, a kind, the viscosity of resin containing liquid, etc.), and a device, the holding time (time agitated) of air, etc. For example, when the ratio of the amount of resin containing liquid and air content which are agitated with the same revolving speed and fed into a device is constant, air bubbles tend to become small, so that there are few total amounts of feeding and the churning time within a device is long. Expansion ratio is controllable by selecting the ratio of the amount of resin containing liquid and air content which are fed into a device.

[0023]The size of the stoma of said porous coating layer surface Cellular formation, the resin containing liquid presentation before distributed processing, That is, since it is influenced in many cases by various factors, such as the kind of material, the rate of a compounding ratio or foaming, coating, quantity that remains eventually through a drying process as an ingredient directly related to the thickness of film in a porous coating layer and expansion ratio, a coating method, and a drying condition, proper conditions need to be set up. Furthermore the size of the stoma of the porous coating layer surface in this invention, Since it is related also to the size of the air bubbles in the cellular content resin liquid obtained by the above-mentioned mechanical agitation, and the stoma of coating and the porous coating layer surface after desiccation also becomes small so that the air bubbles in resin containing liquid are small in general, Although restriction in particular will be in the cellular content state in resin containing liquid, it is preferred in it that distribute and the fine bubble the whose same size as the aforementioned

porous coating layer surface, i.e., an average diameter, is 0.5–50 micrometers contains, and it is good for it more preferably to be in the range of 5–50 micrometers. A photograph of some cellular content resin liquid is taken with an optical microscope, and the size of the contained air bubbles can be measured with an image analyzing device.

[0024] Since the capability of the equipment for giving mechanical churning is insufficient in formation of cellular content resin liquid, an expected cellular content state is not acquired or. Or the stability of the air bubbles in cellular content resin liquid can be suitably selected from the extensive surface activity materials called the foam stabilizer and the foaming agent in order to improve, and it can be blended.

[0025] As such a surface activity material, since the effect which improves the fizz of resin containing liquid, and the stability improvement effect of air bubbles made to distribute and contain are high, especially the alkali salt (for example, higher-fatty-acid ammonium etc.) of higher fatty acid, a higher-fatty-acid denaturation thing, and higher fatty acid can be used. Although there is no restriction in these selections, it is good to check the mobility of resin content mixed liquor, or to select what does not spoil coating workability. As for the amount of the surface activity materials used, such as the above-mentioned foam stabilizer and a foaming agent, it is preferred that it is zero to solid content 30 weight section of surface activity material to solid content 100 weight section of resin liquid or resin liquid, and the mixed liquor of paints, and it is one to 20 weight section more preferably. Even if the addition of surface activity material becomes abundant exceeding 30 weight sections, the effect is saturated and there are many disadvantageous things rather economically.

[0026] As a coating method for forming a porous coating layer in the whole surface or both sides on a sheet supporting body, It can choose from known methods, such as the May Ya Bar method, a gravure roll method, a roll method, a knife method, a reverse roll method, a blade system, an extrusion method, a gate roll method, 2 roll size press type, and a cast method, arbitrarily.

[0027] Although the sheet for solid ink jet type color printers which has a porous coating layer of this invention can show a good solid ink-jet-recording picture also in coating and the dried state on cellular content liquid mixture sheet shaped support, The super calender constituted combining suitably the machine calendar which furthermore comprises two or more steps of metal rolls or a metal roll and the roll made of resin, a metal roll, the roll made from a cotton, etc. is used, Finish processing can be performed to this porous coating layer, and the smooth nature of that surface can be raised further. warming which carried out mirror finish of the surface of the porous coating layer of the sheet which is in a semiarid condition or dryness after coating — or — un— warming — the cast drum of a state, etc. may be made to contact and the surface smoothness may be raised. However, if the above-mentioned smooth finish processing is performed under excessive welding pressure at this time, There is also a possibility that the resin wall which encloses the air bubbles in a porous coating layer may be destroyed, eburnation of a coating layer may take place, and destruction and modification of the fall of cushioning properties, the fall of the competence of the ink of a molten state, or the stoma of the porous coating layer surface may take place as a result.

[0028] Set on the whole surface of the aforementioned sheet shaped support at coating, and the aforementioned cellular content liquid mixture is set at processes, such as coating, desiccation, and rolling up, when drying and manufacturing the sheet for solid ink jet type color printers of this invention, The sheet itself may use a porous coating surface as the inside or the outside, and it may curl. In this case, if it is used after processing into the sheet of a prescribed dimension the sheet which has a porous coating layer of this \*\* by cutting, Troubles, like not only appearance is not good, but feeding to a printer is not performed normally or the performance traverse in the inside of a printer gets worse (for example, paper jam) may occur.

[0029] receiving, in order for such curl to prevent various kinds of troubles produced owing to, the rear face, i.e., the porous coating layer, of a sheet, — an opposite side — a curl prevention layer — coating — or it may laminate. The material of this curl prevention layer, a formation method, a coating amount, the amount of laminations, etc. do not have limitation in particular. Various factors, such as the description of the kind of sheet shaped support, thickness, or a

porous coating layer, i.e., material composition, expansion ratio, and a coating amount, can be taken into consideration, and optimization can be attained.

[0030]On the other hand, it becomes very advantageous from the point of control of curl to form a porous coating layer in both sides of sheet shaped support on equivalent conditions, such as material composition, expansion ratio, and a coating amount. Since a good recorded image can be formed in both sides of the record sheet of one sheet, it can be used for various uses, and also an economical effect also has the advantage that it is large. As solid ink (solid ink), the ink which includes a synthetic wax, an antioxidant, and a coloring color, for example can be used. Although this is a solid at ordinary temperature, within the ink reservoir kept, for example at about 140 degrees, it is a fluid.

[0031]

[Example]The following example explains this invention still more concretely. However, this invention is not restricted by these. Especially the "part" in an example and a comparative example expresses the weight section to the solid content of resin, unless it refuses.

[0032]Foaming treatment was performed so that a continuation foaming machine (trademark: turbo whip TW-70, made in Aicohsha Factory) is used, it might mix [ air and ], the aqueous resin mixed liquor (31% of solids concentration) which has the presentation shown in the example 1 following might be agitated by 1500 rpm of agitating speeds and expansion ratio might increase 1.8 times.

Aqueous resin mixed liquor resin : 100 copies of aqueous acrylic urethane copolymerization resin (trademark: NeoPacR-9013, Zeneka Co. make), Foam stabilizer : Ten copies of higher-fatty-acid systems (trademark: the SN form 200, Sannopuko make), Thickener : The cellular content resin mixed liquor of the carboxymethyl cellulose system (trademark: AG gum, Dai-Ichi Kogyo Seiyaku Co., Ltd. make) 3-copy above After foaming treatment, The applicator bar was immediately used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial 127.9 g/m<sup>2</sup>, coating was carried out so that the coating amount after desiccation might become 10g/[m ]<sup>2</sup>, and it produced on the sheet for printers.

[0033]Foaming treatment was performed so that a continuation foaming machine (trademark: turbo whip TW-70, made in Aicohsha Factory) is used, it might mix [ air and ], the aqueous resin mixed liquor (31% of solids concentration) which has the presentation shown in the example 2 following might be agitated by 1500 rpm of agitating speeds and expansion ratio might increase 4.0 times.

Aqueous resin mixed liquor resin : 100 copies of aqueous polyurethane resin (trademark: NeoRezR-960, Zeneka Co. make), Foam stabilizer : Ten copies of higher-fatty-acid ammonium salt systems (trademark: F-1, Dainippon Ink & Chemicals, Inc. make), Thickener : The cellular content resin mixed liquor of the carboxymethyl cellulose system (trademark: AG gum, Dai-Ichi Kogyo Seiyaku Co., Ltd. make) 3-copy above After foaming treatment, The applicator bar was immediately used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial 127.9 g/m<sup>2</sup>, coating was carried out so that the coating amount after desiccation might become 10g/[m ]<sup>2</sup>, and it produced on the sheet for printers.

[0034]On the rear face of the sheet for printers produced by the same method as example 3 Example 2, using the applicator bar, coating of the cellular content resin mixed liquor produced by the same method as Example 2 was carried out so that the coating amount after desiccation might become 10 g/m<sup>2</sup>, and it produced on the sheet for printers.

[0035]After settling the cellular content resin mixed liquor produced by the same method as example 4 Example 2 for 20 minutes, The applicator bar was used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial 127.9 g/m<sup>2</sup>, coating was carried out so that the coating amount after desiccation might become 10 g/m<sup>2</sup>, and it produced on the sheet for printers.

[0036]The cellular content resin mixed liquor produced by the same method as example 5 Example 2 after foaming treatment immediately, The applicator bar was used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial 127.9

$\text{g/m}^2$ , coating was carried out so that the coating amount after desiccation might become  $35 \text{ g/m}^2$ , and it produced on the sheet for printers.

[0037]The same aqueous resin mixed liquor of a presentation as example 6 Example 2 is made into 1500 rpm of agitating speeds using a continuation foaming machine (trademark: turbo whip TW-70, made in Aicohsha Factory). Making the resin containing liquid amount of supply to a device the same as that of Example 2, air supply was made to increase (about 2.67 times), and foaming treatment was performed so that it might mix [ air and ], it might agitate and expansion ratio might increase 9.0 times. After foaming treatment, immediately, the applicator bar was used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial  $127.9 \text{ g/m}^2$ , coating was carried out so that the coating amount after desiccation might become  $10 \text{ g/m}^2$ , and it produced on the sheet for printers.

[0038]Foaming treatment was performed so that a continuation foaming machine (trademark: turbo whip TW-70, made in Aicohsha Factory) is used, it might mix [ air and ], the aqueous resin mixed liquor (31% of solids concentration) which has the presentation shown in the example 7 following might be agitated by 1500 rpm of agitating speeds and expansion ratio might increase 4.0 times.

Aqueous resin mixed liquor resin : 100 copies of aqueous polyurethane resin (trademark: NeoRezR-960, Zeneka Co. make), Paints : Ten copies of clay (trademark: HT clay, product made from ene gel hard), ten copies of foam stabilizer:higher-fatty-acid ammonium salt systems (trademark: F-1, Dainippon Ink & Chemicals, Inc. make), Thickener : The cellular content resin mixed liquor of the carboxymethyl cellulose system (trademark: AG gum, Dai-Ichi Kogyo Seiyaku Co., Ltd. make) 3-copy above After foaming treatment, The applicator bar was immediately used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial  $127.9 \text{ g/m}^2$ , coating was carried out so that the coating amount after desiccation might become  $10 \text{ g/m}^2$ , and it produced on the sheet for printers.

[0039]The solid ink jet type color printer paper (trademark: premium Bond paper, Sony/tektronix Corp. make solid an ink jet type color printer / trademark :P. standard paper of HASER 300XJS) of comparative example 1 marketing was used as a sheet for printers as it was.

[0040]without it carries out foaming treatment of the resin containing liquid of the same presentation as comparative example 2 Example 2 — the paper of fine quality (trademark: — O.K. prince superior quality.) of commercial  $127.9 \text{ g/m}^2$ The applicator bar was used for the top by Oji Paper Co., Ltd., coating was carried out so that the coating amount after desiccation might become  $10 \text{ g/m}^2$ , and it produced on the sheet for printers.

[0041]After settling the cellular content resin mixed liquor produced by the same method as comparative example 3 Example 2 for 30 minutes, The applicator bar was used on the paper of fine quality (trademark: O.K. prince superior quality, Oji Paper Co., Ltd. make) of commercial  $127.9 \text{ g/m}^2$ , coating was carried out so that the coating amount after desiccation might become  $10 \text{ g/m}^2$ , and it produced on the sheet for printers.

The inkjet printing paper (the paper high grade only for a color ink jet and supplying agency:Kao trade name: Corp.) of comparative example 4 marketing were used as it was. What provided the porous pigment coating layer in stencil paper.

[0042]Measurement or evaluation was performed [ sheet / of measurement, Examples 1-7 of the evaluation above, and the comparative examples 1-5 / for printers ] by the following methods about the expansion ratio of resin containing liquid, and the acquired various characteristics of the printer sheet. The result was shown in the table.

[0043](Expansion ratio) Weight of 100 ml of resin containing liquid (undiluted solution) before foaming treatment was \*(ed) by the weight of 100 ml of resin containing liquid containing the air bubbles after foaming treatment, and it asked for expansion ratio.

(Average stoma diameter) The stoma diameter of the porous coating layer surface, the porous coating layer surface of the obtained sheet for printers — an evaporation apparatus (trademark: — the ion spatter E-102 type.) After vapor-depositing golden-palladium using the Hitachi, Ltd.

make, an optical microscope (trademark: BH-2, Olympus Optical Co., Ltd. make) is used, After taking a Polaroid photograph by one 470 times the magnification of this, the outline of a surface stoma is correctly drawn and copied with a black pen etc. on a bright film, The area in each outline was measured using the drum scanner and the image analyzing device (trademark: roux ZEKKUSU III, Nireco Corp. make), and these arithmetic mean values were made into the average stoma diameter after converting into a circle equivalent diameter. The measuring object face product made each example and a comparative example  $0.06\text{-mm}^2$  (200 micrometers x 300 micrometers). It converted into the circle equivalent diameter because the shape of the stoma of the porous coating layer surface of this invention was not necessarily a perfect circle. (It is also called an aperture area ratio and an aperture area rate) As it described above about the average stoma diameter, the outline of a surface stoma is correctly drawn and copied with a black pen etc. on a bright film, The area in the outline of each stoma was measured using the drum scanner and the image analyzing device (trademark: roux ZEKKUSU III, Nireco Corp. make), and it ~~was~~ and asked for total (area of the puncturing portion occupied by a stoma) of the area in the outline of each stoma by the measuring object (area on the surface of a coating layer).

an aperture area rate (%) = [(area of puncturing portion occupied by stoma)/(area on the surface of coating layer)] x100 (feeling of rough deposit of recorded image) solid ink jet type color printer (trademark-HSER -- 300 XJS) The Sony/tektronix Corp. make was used and the color digital image (classification-symbol [ the highly minute color digital normal standard image data CD-ROM version and ]:N1A, the name:portrait of a picture, editorial supervision: image-processing-technique standardization committee) was formed. Organic-functions evaluation of the feeling of a feel of the whole recorded image surface (feeling of unevenness) was carried out by the three-stage.

O : a rough deposit is not sensed at all.

O : a rough deposit is sensed very small.

x: A rough deposit is sensed.

[0044](Rubfastness of a recorded image) A rubbing test machine (trademark: a SAUZA land type love tester, made in Oriental Energy Machine factory) is used, Applying the pressure of  $0.14\text{ kg/cm}^2$  on the hair part picture of the aforementioned portrait (female picture). The Xerox paper (trademark: a recycling PPC sheet, the Fuji Xerox make) of marketing which has the surface smoothness whose smoothness/J. TAPPI-A method (JAPAN TAPPI No.5) is 25 sec was contacted, and it ~~was~~ by a part for 43 friction speed/. The number of times of a scratch until the ink of a hair picture part adheres to the surface of the Xerox paper was measured. The rubfastness of a recorded image means a good (it rubs and ink does not exfoliate "be alike" easily) thing, so that there is much number of times of a scratch.

(Image quality of a recorded image) Organic-functions evaluation of the image quality of the picture recorded with the aforementioned solid ink jet printer was carried out in two steps.

O : there is no fixing mark, and it is clear, and good.

x: There is the fixing mark and clearness is inferior.

[0045]

[Table 1]

	樹脂の種類	発泡倍率	塗工量 g/m <sup>2</sup>	平均気孔直径 μm	開孔面積率%	画像 ザラツキ感	耐擦 過性	品質
実施例1	7リトルン	1.8	10	17	20	○	30	○
実施例2	ポリリトルン	4.0	10	8	50	◎	90	○
実施例3表	ポリリトルン	4.0	10	8	50	◎	90	○
実施例3裏	ポリリトルン	4.0	10	9	52	◎	87	○
実施例4	ポリリトルン	4.0	10	45	55	◎	75	○
実施例5	ポリリトルン	4.0	35	20	35	◎	80	○
実施例6	ポリリトルン	9.0	10	15	65	◎	45	○
実施例7	ポリリトルン	4.0	10	12	53	◎	35	○
比較例1	—	—	—	—	—	×	7	○
比較例2	ポリリトルン	無発泡	10	—	—	×	9	○
比較例3	ポリリトルン	3.8	10	55	55	◎	70	×
比較例4	—	—	—	—	—	×	10	×

[0046] The sheet for printers which has the porous coating layer obtained in each example is rough in the recorded image by tactile feeling, and does not have admiration (feeling of unevenness), and the rubfastness (the number of times of a scratch shows to Table 1) of the recorded image is excellent so that clearly from Table 1. If the picture (comparative example 1) formed in the standard paper of \*\*\*\* marketing when is touched by hand, a rough deposit is sensed and the scratch-proof test also shows that exfoliation of ink takes place easily. It is clear that it is rough in a recorded image also in coating and the dry sheet (comparative example 2), and there is admiration in the commercial high-quality paper, without giving mechanical agitation to the resin containing liquid of the same presentation as Example 1 (foaming [ no ]), and rubfastness is inferior to it. When an average stoma diameter was 55 micrometers (comparative example 3), the big problem in particular was not seen by a feeling of a rough deposit, and rubfastness, but there was a problem in the clearness of a recorded image.

[0047]

[Effect of the Invention] When the sheet for solid ink jet type color printers of this invention is used for solid ink jet recording, a recorded image part does not have rough tactile feeling, and has rubfastness [ say / that ink does not exfoliate "rub and be alike" easily ], and its practical value is high. When used for the solid ink jet type color printer which this invention carries out melting of the solid ink, injects it on a record sheet from a minute nozzle, and forms a picture by a minute dot, The recorded image which there is no unevenness by climax of ink, and peeling does not produce easily due to a scratch is obtained. The ink by a solid ink jet type color printer is solidified shortly after being given to a record paper face. Therefore, unlike the usual ink jet recording sheet using liquid ink absorbing ink according to capillarity, the record by solid ink forms a record sheet convex part. A recording image is made to smooth by applying a pressure with a roll etc. and stuffing this into the hole on the surface of a coating layer of a record sheet. In this invention, since a coating layer has a comparatively big hole by foaming, the picture which excelled and was excellent in the smoothing characteristic of the heights of a recorded image, rubfastness, etc. is given.

[Translation done.]

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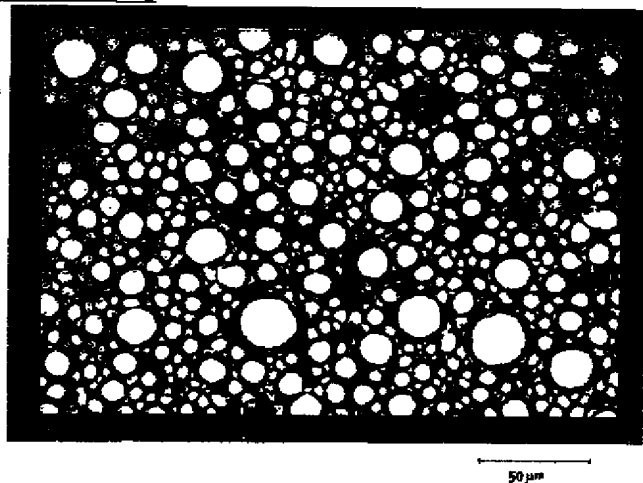
3.In the drawings, any words are not translated.

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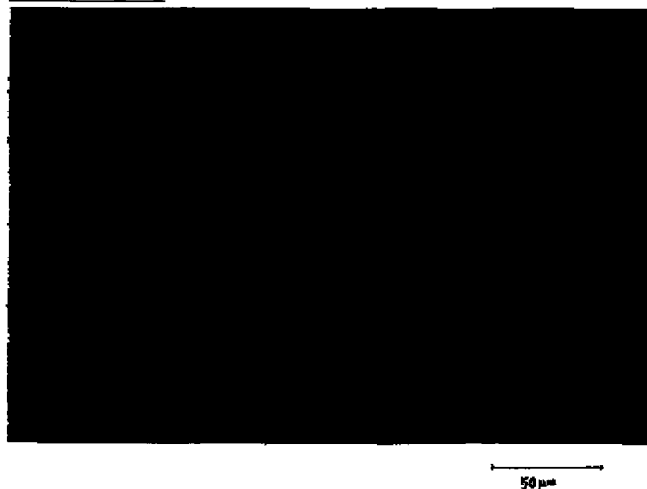
**DRAWINGS**

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[Drawing 1]



[Drawing 2]



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[Translation done.]